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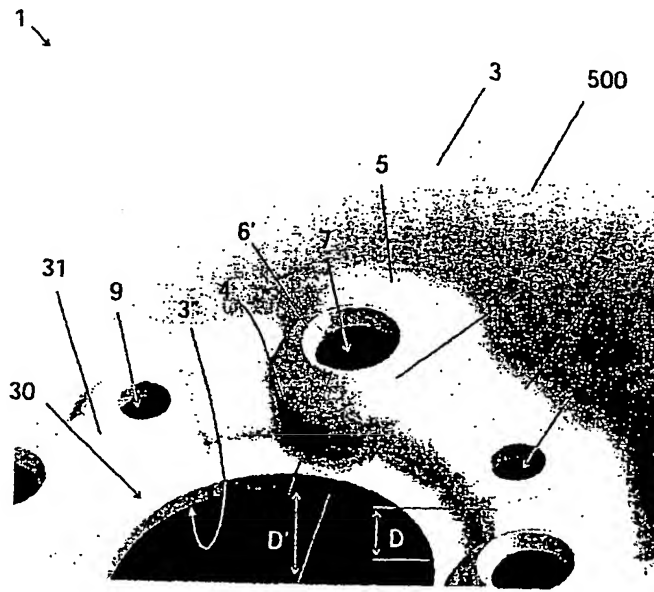
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(54) Title: A WHEEL-DISC WHEEL



(57) Abstract: A wheel (1) is described, particularly for use on vehicles, comprising a disc (3) provided with at least one central region (3'), which has: -at least one bore (7) for fixing the wheel (1) onto a wheel-hub of the vehicle; -at least one central surface (30), substantially opposed to the association surface (3''), the central surface (30) being provided with at least one elevated region (31) having a free end, the length measure between the free end of the elevated region (31) and the association surface (3'') defining a first distance (D), the bore (7) being located in an elevated portion (4, 5, 6) of the disc (3), a free end (6') of the elevation portion (4, 5, 6) defining a second distance (D') as far as the first association surface (3''), the second distance (D') being substantially longer than the first distance (D1).

WO 03/004289 A1



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### Specification of the Patent of Invention for "A WHEEL-DISC WHEEL"

The present invention relates to a wheel from a stamped material, particularly useable on vehicles, attachable to the vehicle by means of removable fixation screws.

#### 5 Description of the Prior Art

Two types of wheel are widely known on the automobile market: the stamped ones, usually made of carbon steel, and those manufactures from light metal alloys.

On vehicles equipped with wheels made of light metal alloys, the  
10 spare wheel (spare tire) is usually made of stamped steel for economic reasons. So, if they are used on vehicles the wheel hubs of which comprise removable fixation screws, various drawbacks arise.

Due to the different mechanical properties inherent in steel and in  
light metal alloys, steel wheels and light-alloy wheels have different thickness  
15 in its central region. In order to meet quality and resistance standards of use on vehicles and due to the particularities in the manufacturing process, which result directly from the material employed, a wheel manufactured from a light metal alloy is thicker in the central portion than a steel wheel. So, at the moment when it was necessary to use the spare wheel, made of steel and of  
20 lesser thickness in the central portion, one found difficulty in fixing it, due to the length of the removable screw, which was suitable for fixing a wheel made of light-metal alloy and became expressive when it was necessary to use the spare wheel.

An apparently immediate alternative would be to increase the  
25 thickness of the stamped plate of the wheel, so as to maintain the area of contact with the hub and, at the same time, make the bore compatible with the screws of wheels made of a light-metal alloy. However, this solution would invariably result in new problems, with a higher cost of material and an excessive increase in the weight of the wheel at the moment of using the  
30 spare wheel.

In achieve this solution, the new thickness of the wheel would have to be much larger than those that existed before, which would bring dif-

difficulties even for its manufacture. In addition to the higher cost, which annuls the advantage of using a steel spare wheel, the substantial increase in the weight of the wheels may impair the stability and steerability of automotive vehicles.

5 Another solution would be to raise the whole profile of the spare-wheel disc, so as to make the bore of the steel wheel again compatible with the longer screws used with wheels of light-metal alloy. However, this solution is also unfeasible, because it impairs the fixation stability of the wheel on the hub, since, in order to maintain the correct fixation, the wheels should  
10 have two substantially circular regions of contact between the disc and the hub. If its thickness were maintained, the mere raising of the profile of the wheel would cause this contact to occur in a single region, seriously impairing the wheel-fixation stability.

Both solutions above proposed make it unfeasible for one to take  
15 advantages of the technological advances achieved in this branch of the automobile sector.

The developed solution was the adoption of spacers on the spare wheels, fixed in each of the bores for fixing screws, with a view to compensate the difference in thickness between the different wheels. This prevents  
20 the screw from touching the bottom of the threaded bore in the wheel hub and, at the same time, provides a correct fixation of the wheel.

However, in spite of solving the existing problems, the utilization of this technique implies a higher production cost, in function of the additional step required for machining and fixing the spacer on the wheel.

## 25 **Objectives of the Invention**

The objective of the present invention is to provide a wheel, especially for use on automotive vehicles, provided with removable fixation screws, the disc of which comprises a structural profile having elevation portions around the regions of fixation of said screws, enabling one to fix the  
30 wheel on the vehicle by using longer screws. A second objective is to provide a wheel disc also provided with said elevation portions.

### Brief Description of the Invention

The objectives of the present invention are achieved by means of a wheel, particularly for use on vehicles, comprising a disc provided with at least one central region, which has:

- 5     - at least one bore for fixing the wheel onto a wheel-hub of the vehicle;
- at least one association surface with the wheel-hub; and
- at least one central surface, substantially opposed to the association surface, the central surface being provided with at least one elevated region having a free end, the length measure between the free end of the
- 10    elevated region and the association surface defining a first distance, the bore being located in an elevation portion of the disc, a free end of the elevation portion defining a second distance as far as the association surface, the second distance being substantially longer than the first distance.

- The objectives of the present invention are also achieved by
- 15    means of a wheel disc for use on a vehicle wheel, comprising a first end portion fixable onto a wheel rim, an association surface associable with a wheel hub of the vehicle and a central surface substantially opposed to the association surface and provided with at least one raised region having a free end, the length measure between the free end of the raised region and the
  - 20    association surface defining a first distance, the disc being characterized by comprising a bore for fixing a wheel, located at a free end of an elevation portion located on the central surface, the length measure between the association surface and the free end configuring a second distance substantially longer than the first distance.

- 25       With the wheel of the present invention, the drawbacks of the prior art are eliminated, without the need to change the thickness of the wheel disc and without impairing the fixation stability provided by the steel wheels of the prior art, since a sufficient contact area is preserved between the disc and the hub.

- 30       After a long analysis of the material employed and of the forms compatible with the wheels in question, one has come how to stamp the disc of the wheel of the present invention, which provides correct seating of the

screws for fixing a light-alloy wheel without the need for spacers, thus optimizing and reducing the production cost, since the production of an additional item (the spacers) is eliminated. In addition, the use of the wheel of the present invention provides greater safety to the user, since the spacers fixed to the wheel eventually get loose, being an unreliable element that has been withdrawn, thus eliminating the risks inherent in the prior art.

Additionally, the partial elevation of the profile around the fixation bore brings about an aesthetic improvement to the wheel of the prior art, since it eliminates the visible spacers, which are esthetically discordant.

#### 10 **Brief Description of the Drawings**

The present invention will now be described in greater detail with reference to an embodiment represented in the drawings. The figures show:

- Figure 1 is a perspective view of the stamped wheel provided with spacers of the prior art;
- Figure 2 is a detailed view of the wheel illustrated in figure 1;
- Figure 3 is a perspective view in detail of a part of the wheel of the present invention; and
- Figure 4 is a longitudinal section schematic view of the wheel of the present invention.

#### 20 **Detailed Description of the Figures**

Stamped-steel wheels usually comprise a rim 2 and a disc 3,300 made of stamped carbon steel, joined to each other preferably by means of welding, the disc 3,300 comprising a first end portion 11 fixable to the rim 2.

The rim 2 has a substantially cylindrical shape and its wall has a cross-section with a shape in which the ends are facing outwards in the direction of the external side of the wheel 1,100, configuring a protrusion, also called "Hump", thus enabling one to place the tire (not shown) correctly. The disc 3,300 optionally has a plurality of vent windows for cooling the brake system of the vehicle, which still functions with esthetic elements, and the center has a bore substantially concentric with the longitudinal axis of the disc 3,300, in order to create a space for the tip of the vehicle axle, which is protuberant when the wheel is mounted thereon. The wheels 100 of the prior

art have spacing elements 35, fixed to the bores for inserting the wheel screws. The spacers are used to enable one to mount the wheel with screws designed for mounting light-alloy wheels, which are longer.

5 The disc 3,300, the shape of which is substantially that of a circular plate with relief portions, has a central region 3', which comprises said concentric bore and at least one or a plurality of bores 7 for fixing the wheel 1. The disc 3,300 still comprises at least one, but preferably a plurality of elevated regions 31 in the form of structural or esthetic protuberances, which compose the appearance of the central region 3'. In the preferred embodiment,  
10 the wheel has as many bores 7 as are necessary. In the region outside the central region, the disc 3 has a large elevation 500.

This central region 3' defines a first central association surface 3", which contacts the wheel-hub when the wheel 1,100 is mounted to the vehicle. Thus, this first surface 3" defines the internal side of the wheel 1,100  
15 the side that touches the wheel hub.

The central region 3" also defines a second central surface 30, located substantially opposed to the first surface 3", which is the external surface of the wheel. The referred-to optional protuberances are located on this second central surface 30.

20 The length measure between the ends of the elevated regions 31 and the first surface 3" is considered a first distance D and is equivalent to the sum of the thickness of the central region 3' of the disc 3 plus the height of the protuberances, when they exist. However, when the wheel 1,100 does not have the elevated regions 31, the first distance D is the thickness measure of the central region 3' of the disc 3.  
25

According to a preferred embodiment and as can be seen from figure 3, the wheel 1 of the present invention still comprises four elevation portions 4, 5, 6, in which are located the four bores 7 for fixing the wheel 1, the elevation portions being substantially orthogonal to the second central surface 30. The elevation portions are substantially conical in shape and  
30 have a free end 6', which presents the bore 7. In this bore, there is a conical surface to facilitate the final tightening of the screw (which is not shown).



Each elevation portion comprises a first region 4, which is substantially orthogonal to and prolongs from the second central surface 30, which is substantially semicylindrical and concentric to the bore 7.

From this first region 4, there is a second region 6, substantially  
5 conical, annular and concentric to the first region 4, the second region 6 projecting substantially angularly from the first region 4 to the free end 6'.

The elevation portions 4, 5, 6 further comprise a third region 5  
substantially adjacent to the free end 6' and parallel to the second central  
surface 30. This third region 5 is also linked to the elevation 500 or to a re-  
10 gion adjacent thereto, so as to be located between the free end 6' and the  
elevation 500.

The length measure between the free end 6' of the elevation por-  
tion 4, 5, 6 and the first association surface 3" defines a second distance D',  
which is substantially longer than said first distance D, since said projection  
15 extends from the second central surface 30. In this way, one can use longer  
screws than those suitable for fixing an ordinary wheel, without spacers, the  
difference between the distance D' and the distance D compensates the  
screw size. As already mentioned, the longer screws are used with light-  
metal-alloy wheels.

20 In order to mount the wheel 1 onto the wheel-hub correctly, four  
contact regions 8 are provided, which are included in the second central  
surface 30 and complement the contact region adjacent the already-  
described concentric bore. The number of contact regions 8 may vary, de-  
pending on the number of fixation bores 7 and of optional protuberances,  
25 provided that the mounting of the wheel is not impaired.

Optionally, there may be bores for guide pins for placing the  
wheel 9, as can be seen in the figures.

The wheel 1 of the present invention may be stamped on any  
material that enables one to manufacture it.

30 A preferred embodiment having been described, it should be un-  
derstood that the scope of the present invention embraces other possible  
variations, being limited only by the contents of the accompanying claims,

which include the possible equivalents.

## CLAIMS

1. A wheel (1), particularly for use on vehicles, comprising a disc (3) provided with at least one central region (3'), which has:

- 5       - at least one bore (7) for fixing the wheel (1) onto a wheel-hub of the vehicle;
- at least one association surface (3'') with the wheel-hub; and
- at least one central surface (30), substantially opposed to the association surface (3''), the central surface (30) being provided with at least one elevated region (31) having a free end, the length measure between the free end of the elevated region (31) and the association surface (3'') defining a first distance (D),
- 10

the wheel (1) being characterized in that the bore (7) is located in an elevation portion (4, 5, 6) of the disc (3), a free end (6') of the elevation portion (4, 5, 6) defining a second distance (D') as far as the association surface (3''), the second distance (D') being substantially longer than the first distance (D).

15

2. A wheel according to claim 1, characterized by comprising a plurality of fixation bores (7).

3. A wheel according to claim 1 or 2, characterized in that the central region (3') comprises at least one substantially plane region (8), circumferentially arranged and adjacent to the elevation portion (5).

20

4. A wheel according to claim 1, characterized in that the elevation portion (4, 5, 6) comprises a first region (4) substantially orthogonal to the central surface (30), the first region (4) being substantially semicylindrical and concentric to the bore (7) and prolonging from said central surface (30).

25

5. A wheel according to claim 1, characterized in that the elevation portion (4, 5, 6) comprises a second region (6) substantially conical and concentric to the first region (4), the second region (6) projecting substantially angular from the first region (4) as far as the free end (6').

6. A wheel according to claim 1, characterized in that the elevation portion (4, 5, 6) comprises a third region (5) adjacent to the free end (6')

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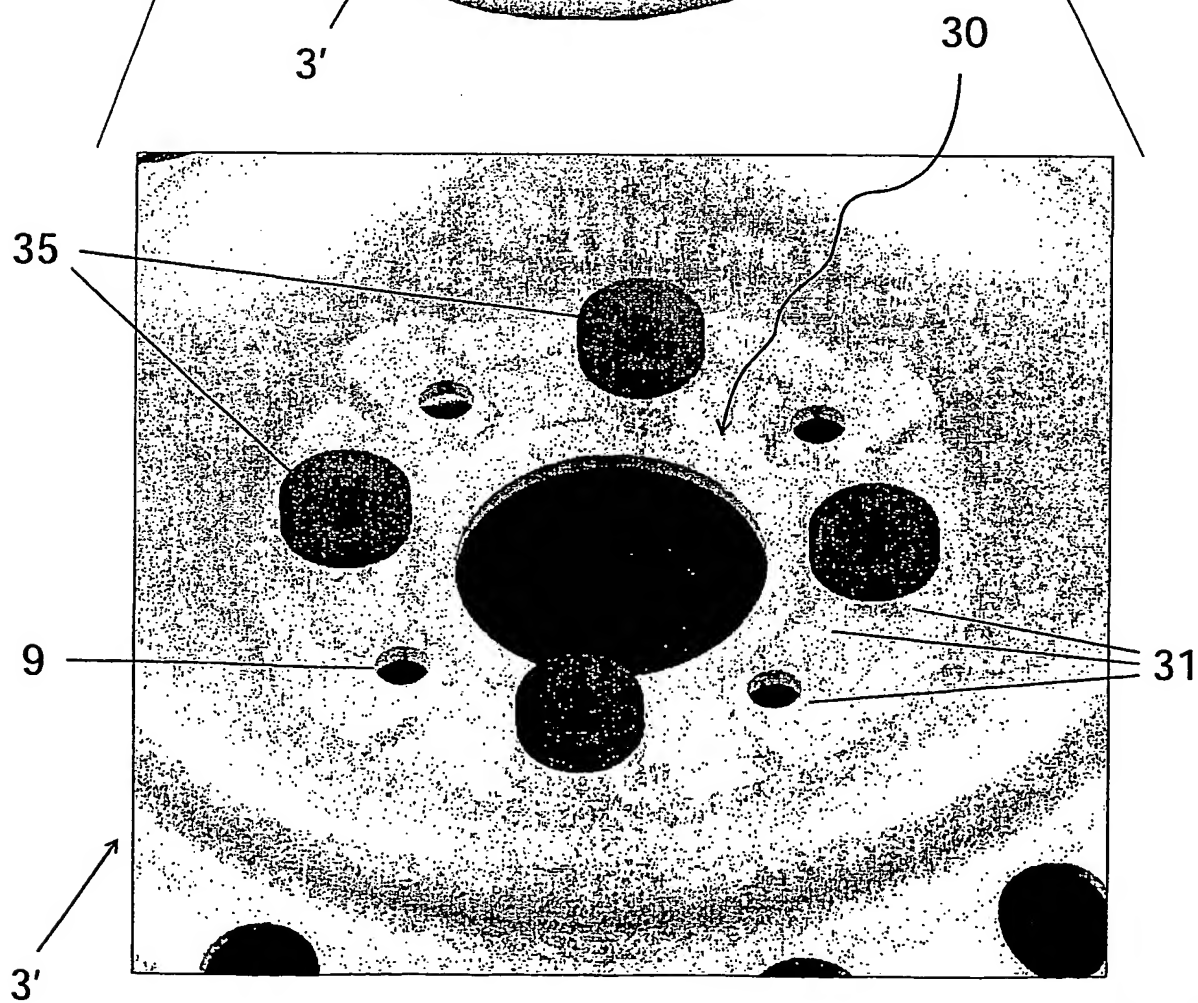
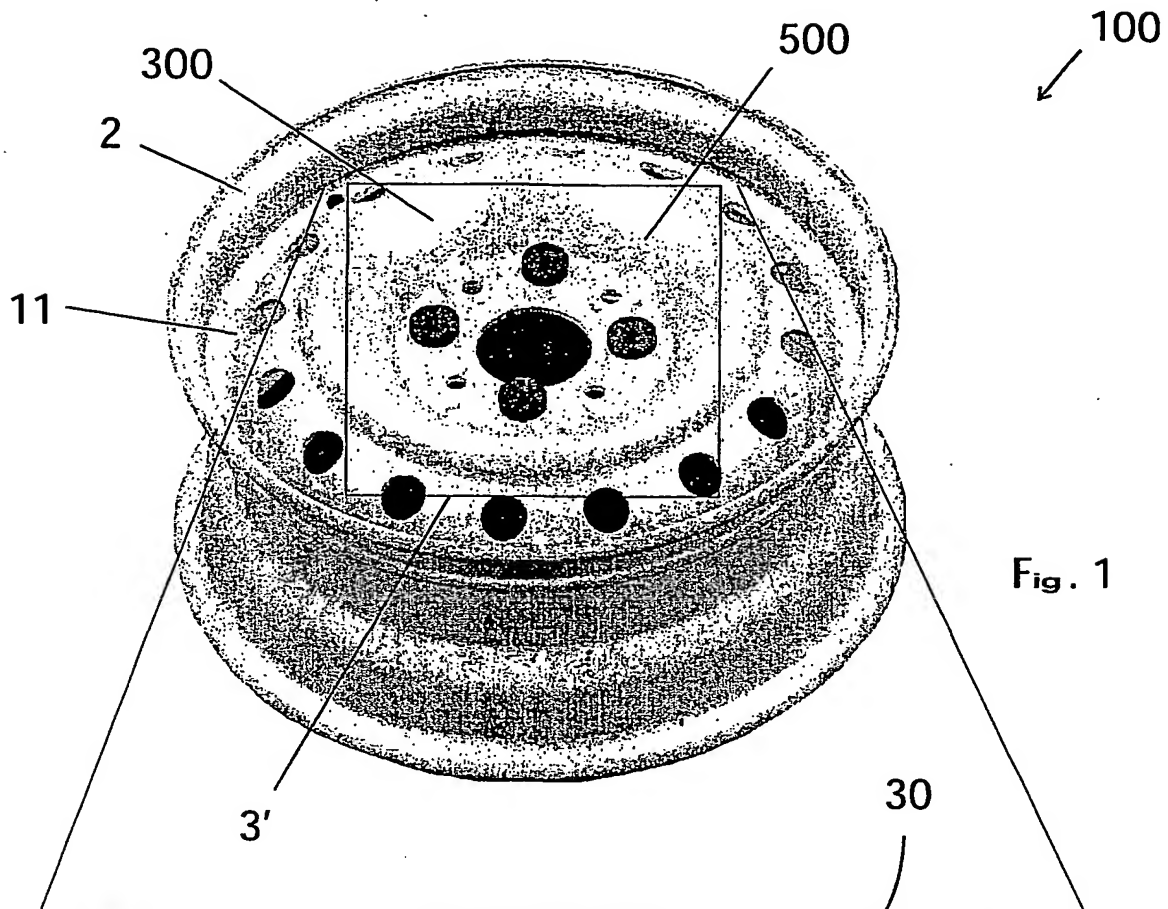
and substantially parallel to the central surface (30).

7. A wheel according to claim 1, characterized in that it is fixed onto the wheel-hub by means of removable screws.

5 8. A wheel-disc (3) for use on a vehicle wheel, comprising a first end portion (11) fixable to a wheel-rim (2), an association surface (3") associable with a wheel-hub and a central surface (30), substantially opposed to the association surface (3") and provided with at least one elevated region (31) having a free end, the length measure between the free end of the elevated region (31) and the association surface (3") defining a first distance (D), the disc (3) being characterized by comprising a bore (7) for fixing the wheel located at one free end (6') of an elevation portion located on the central surface (30), the length measure between the association surface (3") and the free end (6') configuring a second distance (D') substantially longer than the first distance (D).

15 9. A disc according to claim 8, characterized by being substantially circular in shape.

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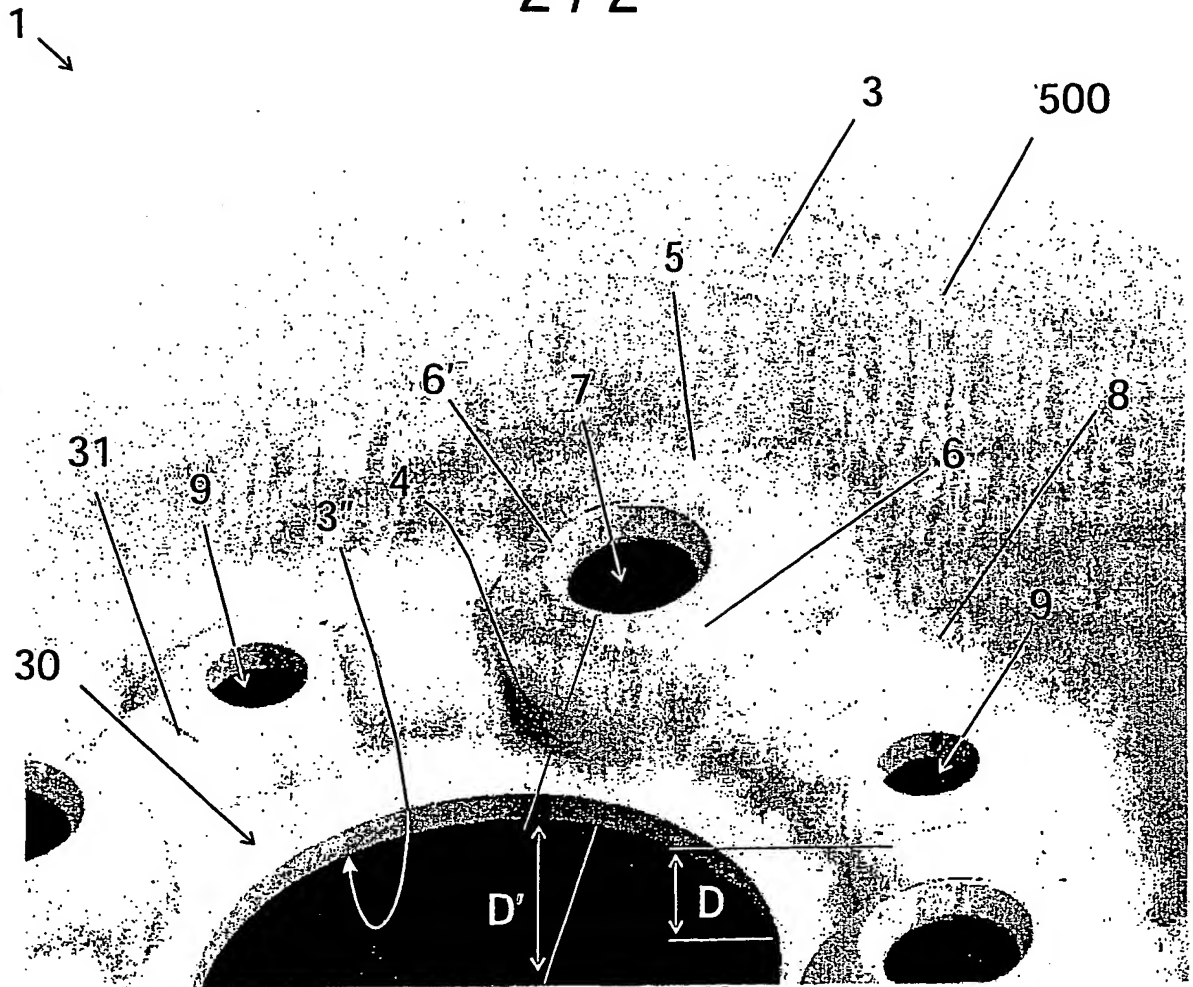


Fig. 3

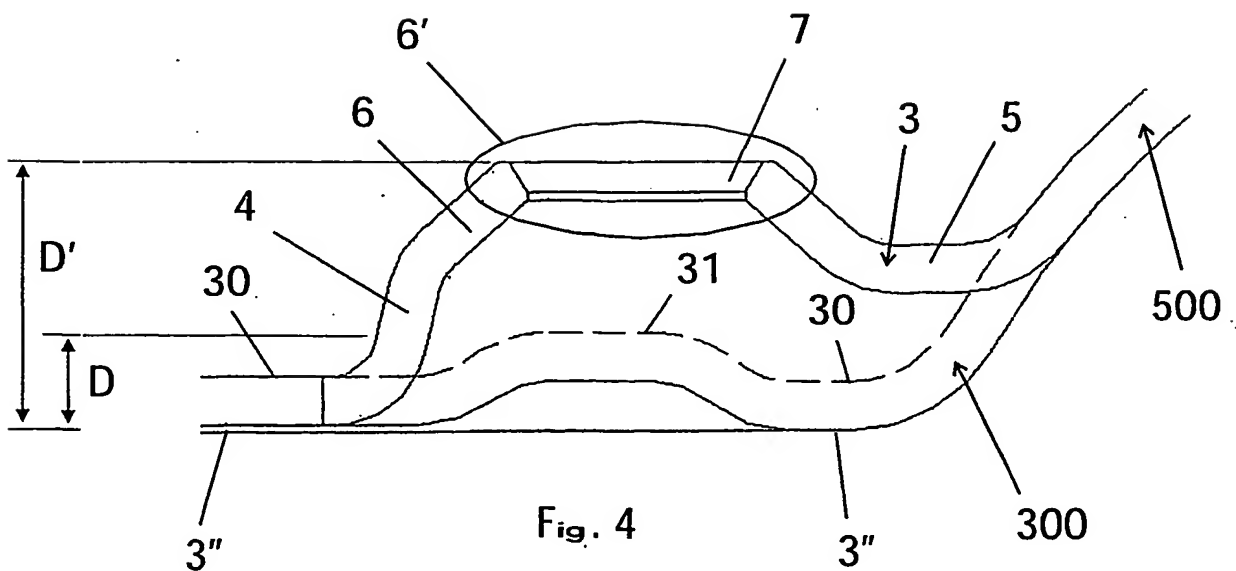


Fig. 4

## INTERNATIONAL SEARCH REPORT

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## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 B60B3/14 B60B3/00 B60B3/16

According to International Patent Classification (IPC) or to both national classification and IPC

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

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## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 35 03 883 A (KRONPRINZ MANNESMANN) 14 August 1986 (1986-08-14) page 3, line 9 - line 30; figures 1,2	1-9
A	DE 196 03 968 A (MANNESMANN AG) 14 August 1996 (1996-08-14) abstract; figures 1-5C	1,8
A	DE 34 42 443 A (KRONPRINZ MANNESMANN) 28 May 1986 (1986-05-28) abstract; figures	1,8
A	US 5 863 103 A (BOENNING MEINHARD ET AL) 26 January 1999 (1999-01-26) abstract; figures	1,8
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☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

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Patent document cited in search report		Publication date	Patent family member(s)	Publication date
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# PCT

## REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

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International Application No.

11 JAN 2002 11 01 02  
International Filing Date

INPI/BRAZIL-PCT INTERNATIONAL APPLICATION  
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Applicant's or agent's file reference  
(if desired) (12 characters maximum) PE-4370

<b>Box No. I TITLE OF INVENTION</b>	
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<b>Box No. II APPLICANT</b> <input type="checkbox"/> This person is also inventor	
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Brazil

This person is:

- ☐ applicant only  
☒ applicant and inventor  
☐ inventor only (If this check-box is marked, do not fill in below.)

Applicant's registration No. with the Office

State (that is, country) of nationality:

BR

State (that is, country) of residence:

BR

This person is applicant for the purposes of:

☐ all designated States☐ all designated States except the United States of America☒ the United States of America only☐ the States indicated in the Supplemental Box

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

OLIVEIRA, Marcio Aparecido de  
Rua Presidente Juscelino Kubsticheck de Oliveira, 305  
Limeira - SP  
Brazil

This person is:

- ☐ applicant only  
☒ applicant and inventor  
☐ inventor only (If this check-box is marked, do not fill in below.)

Applicant's registration No. with the Office

State (that is, country) of nationality:

BR

State (that is, country) of residence:

BR

This person is applicant for the purposes of:

☐ all designated States☐ all designated States except the United States of America☒ the United States of America only☐ the States indicated in the Supplemental Box

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

ROFATTO, Edson Francisco  
Rua Fernando Lencione, 170  
Limeira, SP  
Brazil

This person is:

- ☐ applicant only  
☒ applicant and inventor  
☐ inventor only (If this check-box is marked, do not fill in below.)

Applicant's registration No. with the Office

State (that is, country) of nationality:

BR

State (that is, country) of residence:

BR

This person is applicant for the purposes of:

☐ all designated States☐ all designated States except the United States of America☒ the United States of America only☐ the States indicated in the Supplemental Box

☒ Further applicants and/or (further) inventors are indicated on another continuation sheet.

**Box No. V DESIGNATION OF STATES**

Mark the applicable check-boxes below; at least one must be marked.

The following designations are hereby made under Rule 4.9(a):

**Regional Patent**

- ☒ **AP ARIPO Patent:** GH Ghana, GM Gambia, KE Kenya, LS Lesotho, MW Malawi, MZ Mozambique, SD Sudan, SL Sierra Leone, SZ Swaziland, TZ United Republic of Tanzania, UG Uganda, ZM Zambia, ZW Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT (if other kind of protection or treatment desired, specify on dotted line) .....
- ☒ **EA Eurasian Patent:** AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☒ **EP European Patent:** AT Austria, BE Belgium, CH & LI Switzerland and Liechtenstein, CY Cyprus, DE Germany, DK Denmark, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, TR Turkey, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- ☒ **OA OAPI Patent:** BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, GQ Equatorial Guinea, GW Guinea-Bissau, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT (if other kind of protection or treatment desired, specify on dotted line) .....

**National Patent** (if other kind of protection or treatment desired, specify on dotted line):

- |   |  |  |
|---|--|--|
| <input checked="" type="checkbox"/> AE United Arab Emirates               | <input checked="" type="checkbox"/> GM Gambia                                    | <input checked="" type="checkbox"/> NZ New Zealand                 |
| <input checked="" type="checkbox"/> AG Antigua and Barbuda                | <input checked="" type="checkbox"/> HR Croatia                                   | <input checked="" type="checkbox"/> OM Oman                        |
| <input checked="" type="checkbox"/> AL Albania                            | <input checked="" type="checkbox"/> HU Hungary                                   | <input checked="" type="checkbox"/> PH Philippines                 |
| <input checked="" type="checkbox"/> AM Armenia                            | <input checked="" type="checkbox"/> ID Indonesia                                 | <input checked="" type="checkbox"/> PL Poland                      |
| <input checked="" type="checkbox"/> AT Austria                            | <input checked="" type="checkbox"/> IL Israel                                    | <input checked="" type="checkbox"/> PT Portugal                    |
| <input checked="" type="checkbox"/> AU Australia                          | <input checked="" type="checkbox"/> IN India                                     | <input checked="" type="checkbox"/> RO Romania                     |
| <input checked="" type="checkbox"/> AZ Azerbaijan                         | <input checked="" type="checkbox"/> IS Iceland                                   | <input checked="" type="checkbox"/> RU Russian Federation          |
| <input checked="" type="checkbox"/> BA Bosnia and Herzegovina             | <input checked="" type="checkbox"/> JP Japan                                     |  |
| <input checked="" type="checkbox"/> BB Barbados                           | <input checked="" type="checkbox"/> KE Kenya                                     | <input checked="" type="checkbox"/> SD Sudan                       |
| <input checked="" type="checkbox"/> BG Bulgaria                           | <input checked="" type="checkbox"/> KG Kyrgyzstan                                | <input checked="" type="checkbox"/> SE Sweden                      |
| <input checked="" type="checkbox"/> BR Brazil                             | <input checked="" type="checkbox"/> KP Democratic People's Republic of Korea     | <input checked="" type="checkbox"/> SG Singapore                   |
| <input checked="" type="checkbox"/> BY Belarus                            | <input checked="" type="checkbox"/> KR Republic of Korea                         | <input checked="" type="checkbox"/> SI Slovenia                    |
| <input checked="" type="checkbox"/> BZ Belize                             | <input checked="" type="checkbox"/> KZ Kazakhstan                                | <input checked="" type="checkbox"/> SK Slovakia                    |
| <input checked="" type="checkbox"/> CA Canada                             | <input checked="" type="checkbox"/> LC Saint Lucia                               | <input checked="" type="checkbox"/> SL Sierra Leone                |
| <input checked="" type="checkbox"/> CH & LI Switzerland and Liechtenstein | <input checked="" type="checkbox"/> LK Sri Lanka                                 | <input checked="" type="checkbox"/> TJ Tajikistan                  |
| <input checked="" type="checkbox"/> CN China                              | <input checked="" type="checkbox"/> LR Liberia                                   | <input checked="" type="checkbox"/> TM Turkmenistan                |
| <input checked="" type="checkbox"/> CO Colombia                           | <input checked="" type="checkbox"/> LS Lesotho                                   | <input checked="" type="checkbox"/> TN Tunisia                     |
| <input checked="" type="checkbox"/> CR Costa Rica                         | <input checked="" type="checkbox"/> LT Lithuania                                 | <input checked="" type="checkbox"/> TR Turkey                      |
| <input checked="" type="checkbox"/> CU Cuba                               | <input checked="" type="checkbox"/> LU Luxembourg                                | <input checked="" type="checkbox"/> TT Trinidad and Tobago         |
| <input checked="" type="checkbox"/> CZ Czech Republic                     | <input checked="" type="checkbox"/> LV Latvia                                    |  |
| <input checked="" type="checkbox"/> DE Germany                            | <input checked="" type="checkbox"/> MA Morocco                                   | <input checked="" type="checkbox"/> TZ United Republic of Tanzania |
| <input checked="" type="checkbox"/> DK Denmark                            | <input checked="" type="checkbox"/> MD Republic of Moldova                       | <input checked="" type="checkbox"/> UA Ukraine                     |
| <input checked="" type="checkbox"/> DM Dominica                           | <input checked="" type="checkbox"/> MG Madagascar                                | <input checked="" type="checkbox"/> UG Uganda                      |
| <input checked="" type="checkbox"/> DZ Algeria                            | <input checked="" type="checkbox"/> MK The former Yugoslav Republic of Macedonia | <input checked="" type="checkbox"/> US United States of America    |
| <input checked="" type="checkbox"/> EC Ecuador                            | <input checked="" type="checkbox"/> MN Mongolia                                  |  |
| <input checked="" type="checkbox"/> EE Estonia                            | <input checked="" type="checkbox"/> MW Malawi                                    | <input checked="" type="checkbox"/> UZ Uzbekistan                  |
| <input checked="" type="checkbox"/> ES Spain                              | <input checked="" type="checkbox"/> MX Mexico                                    | <input checked="" type="checkbox"/> VN Viet Nam                    |
| <input checked="" type="checkbox"/> FI Finland                            | <input checked="" type="checkbox"/> MZ Mozambique                                | <input checked="" type="checkbox"/> YU Yugoslavia                  |
| <input checked="" type="checkbox"/> GB United Kingdom                     | <input checked="" type="checkbox"/> NO Norway                                    | <input checked="" type="checkbox"/> ZA South Africa                |
| <input checked="" type="checkbox"/> GD Grenada                            |  | <input checked="" type="checkbox"/> ZM Zambia                      |
| <input checked="" type="checkbox"/> GE Georgia                            |  | <input checked="" type="checkbox"/> ZW Zimbabwe                    |
| <input checked="" type="checkbox"/> GH Ghana                              |  |  |

Check-boxes below reserved for designating States which have become party to the PCT after issuance of this sheet:

<input type="checkbox"/> .....	<input type="checkbox"/> .....	<input type="checkbox"/> .....
<input type="checkbox"/> .....	<input type="checkbox"/> .....	<input type="checkbox"/> .....

**Precautionary Designation Statement:** In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation (including fees) must reach the receiving Office within the 15-month time limit.)

## Supplemental Box

If the Supplemental Box is not used, this sheet should not be included in the request.

1. If, in any of the Boxes, except Boxes Nos. VIII(i) to (v) for which a special continuation box is provided, the space is insufficient to furnish all the information: in such case, write "Continuation of Box No...." (indicate the number of the Box) and furnish the information in the same manner as required according to the captions of the Box in which the space was insufficient, in particular:
  - (i) if more than two persons are to be indicated as applicants and/or inventors and no "continuation sheet" is available: in such case, write "Continuation of Box No. III" and indicate for each additional person the same type of information as required in Box No. III. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below;
  - (ii) if, in Box No. II or in any of the sub-boxes of Box No. III, the indication "the States indicated in the Supplemental Box" is checked: in such case, write "Continuation of Box No. II" or "Continuation of Box No. III" or "Continuation of Boxes No. II and No. III" (as the case may be), indicate the name of the applicant(s) involved and, next to (each) such name, the State(s) (and/or, where applicable, ARIPO, Eurasian, European or OAPI patent) for the purposes of which the named person is applicant;
  - (iii) if, in Box No. II or in any of the sub-boxes of Box No. III, the inventor or the inventor/applicant is not inventor for the purposes of all designated States or for the purposes of the United States of America: in such case, write "Continuation of Box No. II" or "Continuation of Box No. III" or "Continuation of Boxes No. II and No. III" (as the case may be), indicate the name of the inventor(s) and, next to (each) such name, the State(s) (and/or, where applicable, ARIPO, Eurasian, European or OAPI patent) for the purposes of which the named person is inventor;
  - (iv) if, in addition to the agent(s) indicated in Box No. IV, there are further agents: in such case, write "Continuation of Box No. IV" and indicate for each further agent the same type of information as required in Box No. IV;
  - (v) if, in Box No. V, the name of any State (or OAPI) is accompanied by the indication "patent of addition," or "certificate of addition," or if, in Box No. V, the name of the United States of America is accompanied by an indication "continuation" or "continuation-in-part": in such case, write "Continuation of Box No. V" and the name of each State involved (or OAPI), and after the name of each such State (or OAPI), the number of the parent title or parent application and the date of grant of the parent title or filing of the parent application;
  - (vi) if, in Box No. VI, there are more than five earlier applications whose priority is claimed: in such case, write "Continuation of Box No. VI" and indicate for each additional earlier application the same type of information as required in Box No. VI.
2. If, with regard to the precautionary designation statement contained in Box No. V, the applicant wishes to exclude any State(s) from the scope of that statement: in such case, write "Designation(s) excluded from precautionary designation statement" and indicate the name or two-letter code of each State so excluded.

Continuation of Box III

STEIN, Aderval  
Brazilian  
Rua Iolando Donati, 472  
Limeira, SP  
Brazil

MENEGAZI, Aparecido  
Brazilian  
Av. Conego Manuel Alves, 1211  
Limeira, SP  
Brazil

JANIERI, Miguel Angelo  
Brazilian  
Rua Barão, 15,  
CEP 13485-042, Vila Queiroz  
Limeira, SP  
Brazil

These persons are applicants  
and inventors for the purpose  
of the United States only.

**Box No. VI PRIORITY CLAIM**

The priority of the following earlier application(s) is hereby claimed:

Filing date of earlier application (day/month/year)	Number of earlier application	Where earlier application is:		
		national application: country	regional application:* regional Office	international application: receiving Office
item (1) 6 July 2001 (06.07.01)	PI0102773-5	BR		
item (2)				
item (3)				
item (4)				
item (5)				

☐ Further priority claims are indicated in the Supplemental Box.

The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) (*only if the earlier application was filed with the Office which for the purposes of this international application is the receiving Office*) identified above as:

☐ all items   
 ☒ item (1)   
 ☐ item (2)   
 ☐ item (3)   
 ☐ item (4)   
 ☐ item (5)   
 ☐ other, see Supplemental Box

\* Where the earlier application is an ARIPO application, indicate at least one country party to the Paris Convention for the Protection of Industrial Property or one Member of the World Trade Organization for which that earlier application was filed (Rule 4.10(b)(ii)): . . .

**Box No. VII INTERNATIONAL SEARCHING AUTHORITY**

Choice of International Searching Authority (ISA) (if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used):

ISA / EPO

Request to use results of earlier search; reference to that search (if an earlier search has been carried out by or requested from the International Searching Authority):

Date (day/month/year)                      Number                      Country (or regional Office)

**Box No. VIII DECLARATIONS**

The following declarations are contained in Boxes Nos. VIII (i) to (v) (mark the applicable check-boxes below and indicate in the right column the number of each type of declaration):

Number of  
declarations

- |   |  |   |
|---|--|---|
| <input type="checkbox"/> Box No. VIII (i)   | Declaration as to the identity of the inventor   | : |
| <input type="checkbox"/> Box No. VIII (ii)  | Declaration as to the applicant's entitlement, as at the international filing date, to apply for and be granted a patent             | : |
| <input type="checkbox"/> Box No. VIII (iii) | Declaration as to the applicant's entitlement, as at the international filing date, to claim the priority of the earlier application | : |
| <input type="checkbox"/> Box No. VIII (iv)  | Declaration of inventorship (only for the purposes of the designation of the United States of America)                               | : |
| <input type="checkbox"/> Box No. VIII (v)   | Declaration as to non-prejudicial disclosures or exceptions to lack of novelty   | : |

**Box No. IX CHECK LIST; LANGUAGE OF FILING**

This international application contains:

(a) the following number of sheets in paper form:

request (including declaration sheets) : 6  
 description (excluding sequence listing part) : 7  
 claims : 2  
 abstract : 1  
 drawings : 2

Sub-total number of sheets : 18

sequence listing part of description (actual number of sheets if filed in paper form, whether or not also filed in computer readable form; see (b) below) : -

Total number of sheets : 18

(b) sequence listing part of description filed in computer readable form

(i) ☐ only (under Section 801(a)(i))(ii) ☐ in addition to being filed in paper form (under Section 801(a)(ii))

Type and number of carriers (diskette, CD-ROM, CD-R or other) on which the sequence listing part is contained (additional copies to be indicated under item 9(ii), in right column):

This international application is accompanied by the following item(s) (mark the applicable check-boxes below and indicate in right column the number of each item):

1. ☒ fee calculation sheet :  
 2. ☒ original separate power of attorney :  
 3. ☐ original general power of attorney :  
 4. ☐ copy of general power of attorney; reference number, if any: :  
 5. ☐ statement explaining lack of signature :  
 6. ☐ priority document(s) identified in Box No. VI as item(s): :  
 7. ☐ translation of international application into (language): :  
 8. ☐ separate indications concerning deposited microorganism or other biological material :  
 9. ☐ sequence listing in computer readable form (indicate also type and number of carriers (diskette, CD-ROM, CD-R or other)) :  
     (i) ☐ copy submitted for the purposes of international search under Rule 13ter only (and not as part of the international application) :  
     (ii) ☐ (only where check-box (b)(i) or (b)(ii) is marked in left column) additional copies including, where applicable, the copy for the purposes of international search under Rule 13ter :  
     (iii) ☐ together with relevant statement as to the identity of the copy or copies with the sequence listing part mentioned in left column :  
 10. ☐ other (specify): :

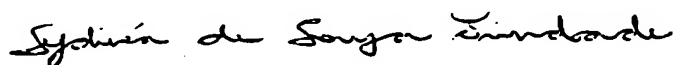
Number of items

Figure of the drawings which should accompany the abstract: 3

Language of filing of the international application: English

**Box No. X SIGNATURE OF APPLICANT, AGENT OR COMMON REPRESENTATIVE**

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).



Dannemann, Siemsen, Bigler &amp; Ipanema Moreira

For receiving Office use only

1. Date of actual receipt of the purported international application:

11 JAN 2002 11 01 02

3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:

4. Date of timely receipt of the required corrections under PCT Article 11(2):

5. International Searching Authority (if two or more are competent): ISA /

6. ☐ Transmittal of search copy delayed until search fee is paid

2. Drawings:

☐ received:☐ not received:

For International Bureau use only

Date of receipt of the record copy by the International Bureau:

# PCT

## FEE CALCULATION SHEET

Annex to the Request

For receiving Office use only

PCT/BR 02/00006  
International Application No.

Date stamp of the receiving Office

Applicant's or agent's  
file reference

PE-4370

Applicant  
MERITOR DO BRASIL LTDA., Divisão LVS

### CALCULATION OF PRESCRIBED FEES

1. TRANSMITTAL FEE . . . . . R\$ 236,00 T

2. SEARCH FEE EUR 945 x 2.13474 . . . . . R\$ 2.017,32 S

International search to be carried out by ISA/EPO

(If two or more International Searching Authorities are competent to carry out the international search, indicate the name of the Authority which is chosen to carry out the international search.)

3. INTERNATIONAL FEE

#### Basic Fee

Where item (b) of Box No. IX applies, enter Sub-total number of sheets } 18  
Where item (b) of Box No. IX does not apply, enter Total number of sheets }

b1 first 30 sheets CHF 140 x 1.43876 . . . . . R\$ 935,19 b1

b2 - x - = - b2  
number of sheets in excess of 30 fee per sheet

b3 additional component (only if sequence listing part of description is filed in computer readable form under Section 801(a)(i), or both in that form and on paper, under Section 801(a)(ii)):

400 x - = - b3  
fee per sheet

Add amounts entered at b1, b2 and b3 and enter total at B . . . . . R\$ 935,19 B

#### Designation Fees

The international application contains 93 designations.

5 x CHF 140 x 1.43876 = R\$ 1007,13 D  
number of designation fees payable (maximum 5) amount of designation fee

Add amounts entered at B and D and enter total at I . . . . . R\$ 1.942,32 I

(Applicants from certain States are entitled to a reduction of 75% of the international fee. Where the applicant is (or all applicants are) so entitled, the total to be entered at I is 25% of the sum of the amounts entered at B and D.)

4. FEE FOR PRIORITY DOCUMENT (if applicable) . . . . . R\$ 75,00 P

5. TOTAL FEES PAYABLE . . . . . R\$ 4.270,64

Add amounts entered at T, S, I and P, and enter total in the TOTAL box

TOTAL

☐ The designation fees are not paid at this time.

### MODE OF PAYMENT

☐ authorization to charge deposit account (see below) ☐ postal money order ☒ cash ☐ coupons  
☐ cheque ☐ bank draft ☐ revenue stamps ☐ other (specify):

### AUTHORIZATION TO CHARGE (OR CREDIT) DEPOSIT ACCOUNT

(This mode of payment may not be available at all receiving Offices)

☐ Authorization to charge the total fees indicated above.  
☐ (This check-box may be marked only if the conditions for deposit accounts of the receiving Office so permit) Authorization to charge any deficiency or credit any overpayment in the total fees indicated above.  
☐ Authorization to charge the fee for priority document.

Receiving Office: RO/

Deposit Account No.:

Date:

Name:

Signature:

# PATENT COOPERATION TREATY

# PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

10/069355

Applicant's or agent's file reference <b>PE-4370</b>	<b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. <b>PCT/BR 02/ 00006</b>	International filing date (day/month/year) <b>11/01/2002</b>	(Earliest) Priority Date (day/month/year) <b>06/07/2001</b>
Applicant  <b>MERITOR DO BRASIL LTDA.</b>		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 4 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

**1. Basis of the report**

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).
- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :
- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

**4. With regard to the title,**

- ☒ the text is approved as submitted by the applicant.
- ☐ the text has been established by this Authority to read as follows:

**5. With regard to the abstract,**

- ☐ the text is approved as submitted by the applicant.
- ☒ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

- ☒ as suggested by the applicant.
- ☐ because the applicant failed to suggest a figure.
- ☐ because this figure better characterizes the invention.

3  
☐ None of the figures.



# INTERNATIONAL SEARCH REPORT

International application No.

PCT/BR 02/00006

## Box III TEXT OF THE ABSTRACT (Continuation of item 5 of the first sheet)

A wheel (1) is described, particularly for use on vehicles, comprising a disc (3) provided with at least one central region (3'), which has:  
-at least one bore (7) for fixing the wheel (1) onto a wheel-hub of the vehicle; -at least one central surface (30), substantially opposed to the association surface (3''), the central surface (30) being provided with at least one elevated region (31) having a free end, the length measure between the free end of the elevated region (31) and the association surface (3'') defining a first distance (D), the bore (7) being located in an elevated portion (4, 5, 6) of the disc (3), a free end (6') of the elevation portion (4, 5, 6) defining a second distance (D') as far as the first association surface (3''), the second distance (D') being substantially longer than the first distance (D).

PCT/BR 02/00006

IPC 7 B60B3/14 B60B3/00 B60B3/16

page 1 of 2

# INTERNATIONAL SEARCH REPORT

International Application No

PCT/BR 02/00006

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>US 3 989 307 A (REPPERT MERLYN R)  2 November 1976 (1976-11-02)  column 3, line 28 -column 6, line 14  -----</p>	1,8

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/BR 02/00006

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
DE 3503883	A	14-08-1986	DE 3503883 A1	14-08-1986
DE 19603968	A	14-08-1996	DE 19603968 A1	14-08-1996
			BR 9607113 A	04-11-1997
			CZ 9702435 A3	18-02-1998
			WO 9624497 A1	15-08-1996
			DE 59605359 D1	06-07-2000
			EP 0807025 A1	19-11-1997
			ES 2146388 T3	01-08-2000
			HU 9800224 A2	28-05-1998
			JP 10513414 T	22-12-1998
			PL 321790 A1	22-12-1997
			US 5971496 A	26-10-1999
DE 3442443	A	28-05-1986	DE 3442443 A1	28-05-1986
US 5863103	A	26-01-1999	DE 19534522 A1	13-03-1997
			CZ 9602607 A3	12-03-1997
			DE 59606310 D1	15-02-2001
			EP 0788895 A2	13-08-1997
			US 5933956 A	10-08-1999
US 3989307	A	02-11-1976	US 3874054 A	01-04-1975
			BR 7409797 A	25-05-1976
			JP 50088701 A	16-07-1975

## PATENT COOPERATION TREATY

PCT

## NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner  
US Department of Commerce  
United States Patent and Trademark  
Office, PCT  
2011 South Clark Place Room  
CP2/5C24  
Arlington, VA 22202  
United States of America  
in its capacity as elected Office

Date of mailing (day/month/year) 13 March 2003 (13.03.03)	
International application No. PCT/BR02/00006	Applicant's or agent's file reference PE-4370
International filing date (day/month/year) 11 January 2002 (11.01.02)	Priority date (day/month/year) 06 July 2001 (06.07.01)
Applicant MAGIOR, Francisco, Antonio et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:  
30 January 2003 (30.01.03)

☐ in a notice effecting later election filed with the International Bureau on:  
\_\_\_\_\_

2. The election ☒ was  
☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

RECEIVED  
JUN 18 2003  
GROUP 3600

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